YL — 7 S□ Series Intelligent Temperature Controller (ITC)

ITC User Guide

★ Please read carefully this entire User Guide before operating ITC. Keep this guide for future references。

1. Product Descriptions

The YL-7S Series is designed and manufactured strictly based on European CE standards, and has gone through five rigorous tests including testing in extreme temperatures (-20℃ to 75℃), testing in various work loads and conditions, and testing using specialized instruments. These tests are designed to ensure the ITC is accurate, reliable and durable in various applications under normal and special working conditions.

YL-7S Series employs advanced expert fuzzy technology and Dual Control Logics. Its built-in auto-calibration intelligence ensures that ITC's performance is accurate, reliable and durable, and can track, lock, revise and react quickly to temperature changes. The built-in auto-calibration intelligence is particularly useful for special temperature control applications, e.g., operating multiple equipments with different temperature requirements each and the resulted heat interference, or, having specific requirements on temperature control related to factors such as heating and cooling capacity and ambiance temperatures. In these special applications, users can easily and quickly obtain a custom set of P, I, D values for their special applications, As a result, YL-7S Series can be used in a wide range of applications. YL-7S Series is an excellent controller for machineries in food processing, glass-making, plastic forming, publishing, packaging, and metal processing. YL-7S Series is also the preferred temperature controller for processes such as temperature sensitive drying, metal heat-treatment, and chemical and mechanic treatments.

This series of products has got the European CE certificate.

Product Features:

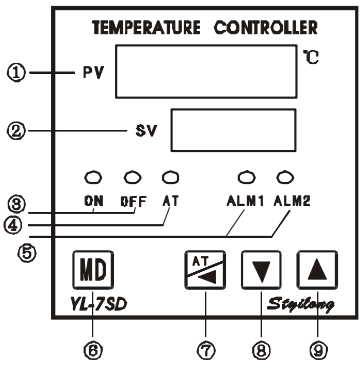
- Easy one-touch auto-calibration for optimal performance
- Fast auto-calibration with high accuracy and reliability
- Capable of accepting any range of values and settings from thermal couples and resistors, and from modeling
- Base zero is adjustable and fully controlled by software, with the precision of ±0.2%FS.
- The main outputs:
  "R" – Relay controlling AC contactor "S" – Impulse zero triggering SSR
  "I" – Current output 4-20mA "U" – Voltage output 0 – 5 VDC
- Two independent alarm channels, which can be programmed to set 4 kinds of alarm combinations.

2. ITC Technical Specifications

Specs	Technical Parameter
Setting Accuracy	All ranges ±0.5% FS, within one degree
Measuring Accuracy	±0.2% FS, within one degree
Sampling Frequency	2 / Second
Input Signals	Standard inputs(single signal):K, Other input signal(single signal):E,S,J,Cu50,Pt100,Pt100/0.1are available.
Temperature Control	(1) Intelligent setting:factory Initial setting P,I,D.But when the temperature is fluctuating around the critical point,the value of P,I and D can be adjusted. (2)Time proportional control:modify I=0,D=0,keep P =30. (3)Reach-stop control:modify P=0,keep I=180,D=30; (4)Upper-lower limit control:modify P=0,and set "HY"(the 16th item in the third level of menu) as what you need to control the section,and set "Fr"(the 18th item in the third level of menu) as "0".
Output Control	Switch Control:"R" – Relay Contact（standard AC220V）, "S" – SSR zero triggering. Modeling Control: "I" – 0~10mA,4~20mA continuous; "U" – 0~5VDC, 1~5VDC
Relay Contact Load	250VAC / 3A (Resistance),250VAC / 1A (Sensing,Cosϕ=0.4)
Impulse Voltage Load	12VDC,Max 40mA (To drive SSR,to protect short circuit)
Model Current Voltage Load	(Standard) 0-5VDC,4-20mA,Load Resistance Max=500Ω
Alarming	Set upper and lower Limit on Deviation and absolute level（4 kinds）
Alarm Output	Relay：250VAC / 3A(Resistor), 250VAC / 1A(Conductive,Cosϕ=0.4）
Power Consumption	180-240VAC , 50-60Hz ≤3W
Insulation Resistant	≥10MΩ(Testing Condition 500VDC) (Outputting current or non-contactor voltage; no test for I/O ports and the resistance of CT input)
Ambiance Temperature	Temperature:-20~+75°c ,Humidity:35 ~85%RH

3. ITC Technical Specifications

1) ITC Panel Layout



① "PV" window (in red):shows the actual temperature and various functions symbols

② "SV" window (in green):displays user's preset desired temperature, factory initial settings,and auto-calibrated parameters as well as user's preset parameters.

③ "ON" (green light on)indicates the output ports are open;"ON" (green light go out) indicates the output port is closed.

④ "AT" light (yellow) flashes during ITC's auto-calibration process.

⑤ "ALM1","ALM2":Signal lights of two alarm channels (red),operating independently.

⑥ "MD":Mode selection key for: presetting, reviewing or confirming settings and parameters.

⑦ AT Activating auto-calibration; move the cursor left when setting calibration parameters.

⑧ ▼Decrease or⑨▲ increase the values to the desired parameters.

2) ITC Panel Display

①Normal display: After connecting to power, the "PV" window will show transmitter types, such as "K", and then current temperature; "SV" window shows "PID" and then preset desired temperature.

②Normally, the "PV" window may flash the following values

"HHHH" – input values are too high, or, incorrect settings on transmitter, or input disconnect; etc.

"LLLL" – input values are too low, or, incorrect settings on transmitter, connection error; or input short circuit; etc

"Erro"– Exchange parameter out of ranges, incorrect settings on transmitter, connection errors, short circuit in input

source, or disconnect,etc.

Values displayed in the “PV” window are correct despite the "HHHH"and "LLLL" errors but the "PV" values are incorrect under the error message"Erro".

3) ITC Functions and Parameters

Setting of the temperature:After instrument start to work, click "MD" key lightly, then the first green LED flashes on the right side below "SV" window, enter the state of setting temperature, each click " AT " key, cursor shift leftwards as the digital tube flashing at the same time, until temperature become a desired value, with pressing "▼" or "▲" key to chang temperature value to be what is needed.At last,press "MD" to confirm the setting and exit the menu.

For setting, modifying the upper limit and lower alarm threshold value, and adjusting the P, I, D and other parameters, users should enter the second level menu to set and modify them. Specific operation is as follow:Press "MD" key for about 6 seconds, "AL1" (the upper limit alarm) will appear on "PV" window, and "50" appears on "SV" window, then each click on the "MD" key, press the sequence parameters, reset or modify any function parameters,as user need.

Please refer to the table below password and operate in order:

Symbol	Term	Ranges	Descriptions	Initial
AL1	Alarm Upper limit	-199~9999 ℃	Set alarm upper limit,and deviation of this limit over preset temperature value	50℃
AL2	Alarm Lower Limit	-199~9999 ℃	Set alarm lower limit,and deviation of this limit under preset temperature value。	0℃
Pb	Measurement Revision	-99~+100℃	Revise deviations from initial circuit input and from compensating thermal couple (resistor)	0℃
P	Scaling setting (Heating)	0.0~999.9℃	Set interval control, P=20℃ in general or 50℃ for powerful heater Set P=0 for point control.	20℃
I	Integral Time (Repetitive)	0~ 3600s	Mostly 60～240S. Increase I if temperature fluctuates regularly; decrease I for persistent deviations.	150s
D	Differential Time (Preset)	0.0~999.9s	Mostly 1/3～1/5. Increasing D lessens system’s over-heat but weaken the anti-interference capability	30s
T	Control Cycle (Heating)	1~99 s	Set temperature control cycles. Cannot set to"0".Relay output: 20 seconds; Logic	20s/2s /1s
AT	Auto-Calibration	0~1	"0"= Off;"1"=On (See Control Panel)	0
Lock	User Input Lock	0~2	"0":free to input;"1":input preset only;"2":locked	0

4) Advanced Parameter Settings

This intelligent series has advanced settings (Third level special parameters menu) for engineers or senior experienced users. Ordinary users had better not regulate the original parameters, in order to avoid confusing procedures.

Method of operation to enter third level menu is as follow:Press and hold both the"MD" and AT keys at the same time until "PASS" is shown in the SV window and "0000" is shown in the PV window.Then, release AT key after release "MD" key. Input "0000" in the SV window to enter the "menu code" as follow,thus you can reset or modify relevant parameters.Press "MD" key to confirm after set or modify parameters in order,then return to "PASS" and exit the menu.

Please refer to the table below password and operate in order:

Codes	Symbol	Definition	Descriptions	Values/Ranges
14	**ALP**	Alarms Settings (A:Absolute value	"0": Upper/Lower limits =(A)/(A) "1":Upper/Lower limits = (D)/(A) "2":Upper/Lower limits =(A)/(D) "3":Upper/Lower limits =(D)/(D)	0,1,2,3 Factory Initial setting:1
15	**Fsr**	Maximum Preset	Preset max value according to transmitters	Factory Initial setting: K~0℃/1300℃
16	**Hand**	Automatic /Manual shifting	Set "Hand" as "0";automatic P,I,D regulation;Set "Hand" as "1",manual regulate the percentage of output power (press "displacement" key to enter/exit manual state, press " ▲ " and " ▼ " key to regulate the percentage of output power).	0~1. Factory Initial setting:0
17	**Ctrl**	Input Control Method	Rly: Switch input control,relay contact voltage controlled AC contactor,12VDC pulse voltage control single and three phase SSR. 1.1-5V:4-20mA analog continuous electric current output drive single and three phase regulating voltage module; 2.0-5V:DCO-5V analog continuous voltage drive single and three phase regulating voltage module.	Factory Initial setting: "R" – Drive AC contactor. "S" – Driver solid state relay "I" – Drive voltage regulating module U" – Drive voltage regulating module
18	**Fr**	Proportional Band Advanced Quantity	Under the condition do not change the P value of proportional band's advancement, can reduce the amplitude of first heating inertia effectively .	0~100. Factory Initial setting:15
19	**Tt**	Trace Amount of Fuzzy Temperature	In some special occasions, the temperature value display on the instrument can be controlled in a range of ±Tt, and close the preset value steadily.	0~20 Factory Initial:0
20	**PO**	Initial Output Power	In some occasions, temperature controller need to be switched on or off frequently, the phenomena of rising,decline and fluctuation of temperature can be reduced.	0~100 Factory Initial:10%
21	**P1**	Initial Output Power After enter Proportional Band	When the temperature enter the proportional band range first time,an initial output power to the temperature controller can reduce the rising of temperature effectively, and speed up the instrument enter a stable state of control.	0~100 Factory Initial:10%
22	**Ov**	Primary Output Power Of Scaling Setting	Set a primary output power when temperature come into scaling setting firstly.	0~100 Factory Initial:10%

5) Advanced Functions – Linear Signal Input

When inputting Leaner signals,both"PSH"and "DP" have to be defined correctly for this ITC to maximize its performance. Leaner signal values can be 0-5V,1-5V,or 0-10mA,4-20mA.Especially：

①If input signal is 0-5V， the PV value is defined by

PV = Vx/(PSH – PSL)+ PSL where Vx is the input signal, in Voltage

②If input signal is 1-5V， the PV value is calculated by

PV =(Vx –1)/(PSH – PSL)+ PSL where Vx is the input signal, in Voltage

③When input signals are 0-10mA and 4-20mA, they can be converted into 0-5V and 1-5V voltage signals using resistors

with 250Ω and 500Ω, respectively. Their"PSH" and "DP" values can then be calculated accordingly using the 0-5V and 1-5V formulas above.

4. Wire Connection Map

1.Special Notes

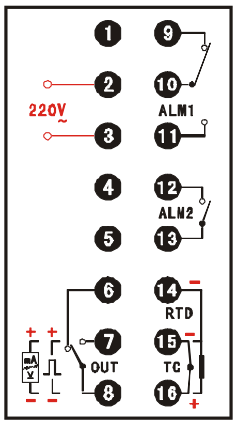
(1) Thermal couples input, use compensating wire with corresponding codes

(2) Thermal resistor input, use three identical compensating wires with low resistant

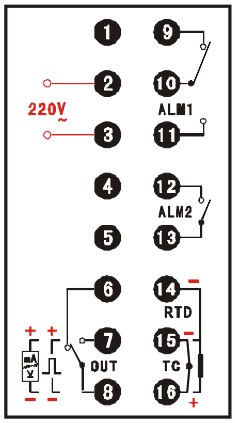
(3) Signal input wires should avoid magnetic interference from power lines electronic applicants.

2.Wire Connection Layout

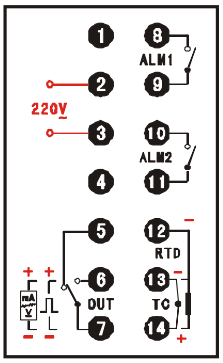
(1) YL-7SA



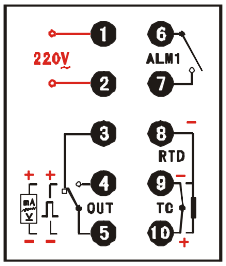
(2) YL –7SB



(3) YL–7SD



(4) YL–7SE



Notes:

- Standard input signals 4～20mA can be converted into 0～5V using resistors 250Ω/500Ω, respectively.
- Input connecting ports:

  YL-7SA ,YL-7SB and YL-7SD use Ports (2) and (3);

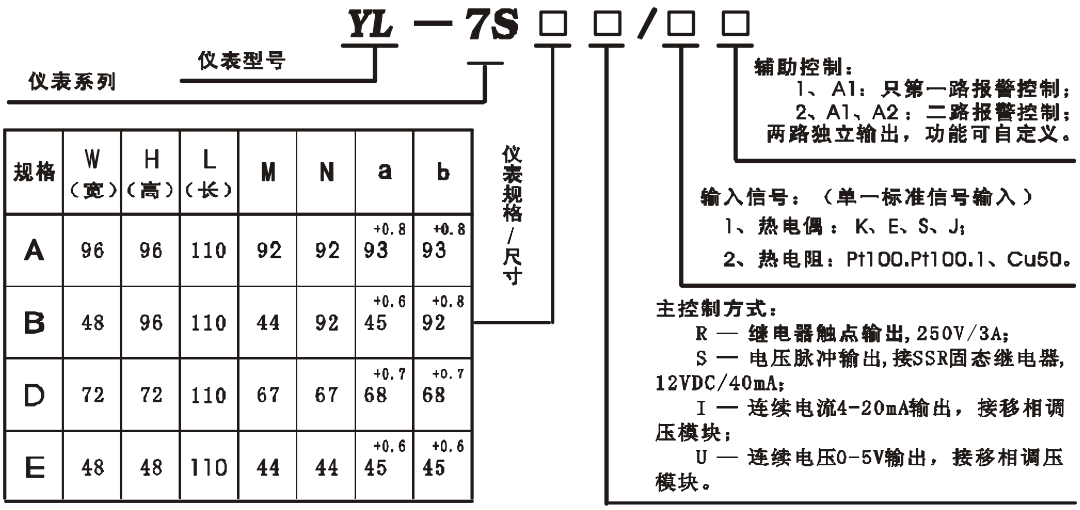
  YL-7SE:use Ports (1) and (2).

5. ITC Series Number Descriptions

Please verify the products you received with your orders (series number, model, specs), as follows.

ITC product series number has 10 digits such as YL–07AR/12. Each digit shows the following information:

Digit	Possible Values	Descriptions
1st, 2nd	YL	ITC Model
3rd	-	Separator
4th, 5th	07S	ITC Series
6th	A to F	Product dimension and specs
	See the table below for its W (wide), H (height), L (length), M, N, a, b for each values of A to F	
7th	R, S, I, U	R=Relay output 250V/3A; S=Impulse voltage output for SSR 12VCD/40mA I=Current output 4-20mA, 0-10mA; U=Voltage output 0-5VDC, 1-5VDC
8th	/	Separator
9th	1,2	Input signals: 1=Thermal Couples: K, J, E, S, N, T, B, R, Wer 2=Thermal Resistor: PT100,Pt100.1,Cu50.
10th	1,2	Secondary Controls 1=A1: One channel alarm control 2=A1, A2: two independent alarm channels, any configuration combinations



规格	W（宽）	H（高）	L（长）	M	N	a	b
A	96	96	110	92	92	+0.8 93	+0.8 93
B	48	96	110	44	92	+0.6 45	+0.8 92
D	72	72	110	67	67	+0.7 68	+0.7 68
E	48	48	110	44	44	+0.6 45	+0.6 45

▲ ITC Operation Notes

1.Ambiance requirements for this ITC: pressure:86~105KPa,temperature 0~50℃,Relative humidity 45~ 85%RH.

2.Do not operate ITCs right after dramatic ambiance temperature changes such as moving from cold outdoor to warm indoor.

3.Do not operate ITC in humid, salty and dusty surroundings or near combustible and corrosive materials such as gasoline, chemicals, metal powders.

4.Do not operate ITC on a tremble and unstable structure.

5.When placing multiple ITCs in the same location, keep a distance of 25mm horizontally and 30mm vertically between ITCs.